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Applicant	:	Simon C. Steely, Jr., et al.
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For	:	SYSTEM AND METHOD FOR CONFLICT RESPONSES IN A CACHE COHERENCY PROTOCOL WITH ORDERING POINT MIGRATION
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AMENDED APPEAL BRIEF

Sir:

Pursuant to the Notice of Notice of a Non-Compliant Appeal Brief issued for this case on November 13, 2007, Applicant's representative presents this Amended Appeal Brief.

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II. REAL PARTY IN INTEREST

The real party in interest is Hewlett-Packard Development Company, L.P., as indicated by the Assignment recorded January 20, 2004, Reel/Frame: 014917/0832.

III. RELATED APPEALS AND INTERFERENCES

At the time of filing this Appeal Brief, the following related applications are currently under Appeal: "CACHE COHERENCY PROTOCOL WITH ORDERING POINTS," Application Serial No. 10/760,640; "SYSTEM AND METHOD FOR RESOLVING TRANSACTIONS IN A CACHE COHERENCY PROTOCOL," Application Serial No. 10/760,813; "SYSTEM AND METHOD TO FACILITATE ORDERING POINT MIGRATION TO MEMORY," Application Serial No. 10/760,599; "SYSTEM AND METHOD FOR CREATING ORDERING POINTS," Application Serial No. 10/760,652; "SYSTEM AND METHOD FOR NON-MIGRATORY REQUESTS IN A CACHE COHERENCY PROTOCOL," Application Serial No. 10/760,659.

IV. STATUS OF CLAIMS

Claims 1-40 which are attached in Appendix A, are currently pending in this application. Claims 1-9, 12-14, 16-22, 25-29, 31-37 and 39-40 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent Pub. No.

2002/012929211 to Arimilli, et al. ("Arimilli"). Claims 10-11, 23-24, 30 and 38 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Arimilli in view of U.S. Patent Pub. No. 6,138,218 to Arimilli, et al. ("Arimilli 2"). Claim 15 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Arimilli in view of Arimilli 2 and in further view of U.S. Patent Pub. No. 6,883,070 to Martin et al. ("Martin"). The rejection of claims 1-40 is appealed.

V. STATUS OF AMENDMENTS

A Final Office Action ("Final Action") was issued for the present application on March 29, 2007. No amendments were made to the claims after the Final Action.

VI. SUMMARY OF THE CLAIMED SUBJECT MATTER

A. Claim 1

One aspect of the present invention, as recited in claim 1, is directed to a system (100 of FIG. 5) comprising a first node (102 of FIG. 5) that provides a source broadcast request for data (Par. [0098]). The first node (102 of FIG. 5) is operative to respond in a first manner to other source broadcast requests for the data while the source broadcast request for the data is pending at the first node (Par. [0095]). The first node (102 of FIG. 5) being operable to respond in a second manner to the other source broadcast requests for the data in response

to receiving an ownership data response at the first node (102 of FIG. 5; Par. [0095]). The ownership data response comprising a copy of the data (Par. [0049]).

B. Claim 2

Claim 2 is directed to the system (100 of FIG. 5) of claim 1, wherein the ownership data response comprises an indication to the first node (102 of FIG. 5) that the data associated with the ownership data response comprises migratory data (Pars. [0061] and [0094]).

C. Claim 3

Claim 3 is directed to the system (10 of FIG. 1) of claim 2, wherein the migratory data comprises a cache ordering point for serializing source broadcast requests for the data (Par. [0042]). The cache ordering point migrating to the first node (10 of FIG. 1) from a node (14 of FIG. 1) that provides the ownership data response (Par. [0042]).

D. Claim 4

Claim 4 the system (240 of FIG. 10) of claim 3, wherein the first node (242 of FIG. 10) is operative to provide an ownership data response to a second node (244 of FIG. 10) requesting the data (Par. [00114]). The cache ordering point migrates from the first node to the second node (Par. [00115]).

E. Claim 5

Claim 5 is directed to the system (220 of FIG. 9) of claim 1, wherein the source broadcast request from the first node (222 of FIG. 9) comprises a source broadcast read request (Par. [00108]). The first node (222 of FIG. 9) when responding in the first manner, provides a first response to the other source broadcasts requests for the data indicating that the first node (222 of FIG. 9) has a conflicting read request for the data (Par. [00110]).

F. Claim 6

Claim 6 is directed to the system (240 of FIG. 10) of claim 5, further comprising a second node (244 of FIG. 10) that provides one of the other source broadcast requests for the data and receives the first response from the first node (244 of FIG. 10; Par. [00112]). The second node (244 of FIG. 10) being operative to fill a shared copy of data received from a third node (248 of FIG. 10) in response to one of the other source broadcast requests for the data (Par. [00114]).

G. Claim 7

Claim 7 is directed to the system (240 of FIG. 10) of claim 5, wherein the second node (244 of FIG. 10) provides one of the other source broadcast requests for the data and receives the first response from the first node (242 of FIG. 10; Par [00112]). The second node (244 of FIG. 10) is operative to fill a copy of data received from a home node for the data (Par. [00114]).

H. Claim 8

Claim 8 is directed to the system (240 of FIG. 10) of claim 1, wherein the first node (242 of FIG 10), when responding in the second manner, provides a second response to the other source broadcast requests for the data (Par. [00113]). The second response indicating that the source broadcast request from the first node (242 of FIG. 10) is a conflicting request for the data (Par. [00113]). The second response indicating migration of the data to the first node (242 of FIG. 10) is in progress (Par. [00113]).

I. Claim 9

Claim 9 is directed to the system (180 of FIG. 7) of claim 8, wherein a second node (184 of FIG. 7) provides one of the other source broadcast requests for the data (Par. [00102]). The second node (184 of FIG. 7) receives the second response from the first node (182 of FIG. 7; Par. [00102]). The second node (184 of FIG. 7) is operative to employ a copy of the data received from a third node (188 of FIG. 7) for a single use (Par. [0103]).

J. Claim 10

Claim 10 is directed to the system (220 of FIG. 9) of claim 8, wherein a second node (224 of FIG. 9) provides one of the other source broadcast requests for the data (Par. [00110]). The second node (224 of FIG. 9) receives the second response from the first node (202 of FIG. 8; Par. [00109]). The second node

(224 of FIG. 9) is operative to employ a forward progress technique to obtain the data (Par. [00111]).

K. Claim 11

Claim 11 is directed to the system (220 of FIG. 9) of claim 10, wherein the forward progress technique comprises a forward progress cache coherency protocol (Par. [00111]).

L. Claim 12

Claim 12 is directed to the system (100 of FIG. 5) of claim 1, wherein the first node (102 of FIG. 5) employs an invalidate line command to other nodes (106 of FIG. 5) to remove incorrect copies of the data and any stale copies of the data caches at other nodes (106 of FIG. 5) of the system (100 of FIG. 5; Par. [0060]).

M. Claim 13

Claim 13 is directed to the system (100 of FIG. 5) of claim 1, wherein the source broadcast request provided by the first node (102 of FIG. 5) is broadcast using a source broadcast cache coherency protocol (Par. [0090]).

N. Claim 14

Claim 14 is directed to the system (100 of FIG. 5) of claim 1, wherein the first node (102 of FIG. 5) defines a processor (102 of FIG. 5) having an associated cache (114 of FIG. 5), the associated cache (114 of FIG. 5) of the processor (102 of FIG. 5) comprising a plurality of cache lines (116 of FIG. 5;

Par. [0088]). Each cache line (116 of FIG. 5) has a respective tag address that identifies associated data (Par. [0088]). Each cache line (116 of FIG. 5) also has state information that indicates a state of the associated data for the respective cache line (116 of FIG. 5; Par. [0088]). The processor (102 of FIG. 5) being capable of communicating with other nodes of the system through an interconnect (108 of FIG. 5; Par. [0085]). The system (100 of FIG. 8) further comprising a cache controller (118 of FIG. 5) associated with the processor (102 of FIG. 5), the cache controller (118 of FIG. 5) being operative to manage data requests and responses for the associated cache of the processor (102 of FIG. 5; Par. [0089]). The cache controller (118 of FIG. 5) effecting state transitions associated with the data in the associated cache (114 of FIG. 5) of the processor (102 of FIG. 5) based on the data requests and responses for the associated cache (114 of FIG. 5) the processor (102 of FIG. 5; Par. [0090]).

O. Claim 15

Claim 15 is directed to the system (100 of FIG. 5) of claim 1, wherein the system (100 of FIG. 5) implements a hybrid cache coherency protocol (Par. [0029]). The first node (102 of FIG. 5) employs a source broadcast based protocol to issue the source broadcast request for the data (Par. [0086]). The first node (102 of FIG. 5) employing an associated forward progress protocol to reissue a request for the data in response to the request failing in the source broadcast protocol (Par. [0086]).

P. Claim 16

Another aspect of the invention, as recited in claim 16 is directed to a multiprocessor network (10 of FIG. 1), comprising a source processor node (12 of FIG. 1) that provides a source broadcast read request for data (Par. [0039]). The source processor node (12 of FIG. 1) issuing an invalidate line command to other processor nodes (14 and 20 of FIG. 1) of the system (10 of FIG. 1) in response to receiving a data response that transfers a copy of the data and a cache ordering point for the data to the source processor node (Par [0061]).

Q. Claim 17

Claim 17 is directed to the multi-processor network (240 of FIG. 1) of claim 16, wherein the invalidate line command issued by the source processor node (242 of FIG. 10) removes incorrect cached copies of the data at the other processor nodes (14 and 20 of FIG. 1) of the system and stale copies of the data filled at the other processor nodes (14 and 20 of FIG. 1) of the system (Par [0061], [0072]).

R. Claim 18

Claim 18 is directed to the multi-processor network (240 of FIG. 1) of claim 16, wherein the source processor node (242 of FIG. 10) is operative to provide a first conflict response to source broadcast requests for the data from the other processor nodes (244 of FIG. 10) prior to receiving the data response that transfers the cache ordering point for the data to the source processor node

(242 of FIG. 10; Par. [00113]). The source processor node (242 of FIG. 10) is operative to provide a second conflict response to at least one source broadcast request for the data from at least one of the other processor nodes (244 of FIG. 10) in response to the source processor node (242 of FIG. 10) receiving a conflict response and receiving the data response that transfers the cache ordering point for the data to the source processor node (242 of FIG. 10; Par. [00114]).

S. Claim 19

Claim 19 is directed to system (220 of FIG. 9) of claim 18, wherein the source processor node (222 of FIG. 9) provides the first response to the source broadcast requests for the data from the other processor nodes (224 of FIG. 9) when the source processor node (222 of FIG. 9) has a pending conflicting read request for the data (Par. [00110]).

T. Claim 20

Claim 20 is directed to the system (180 of FIG. 1) of claim 19, wherein the other processor nodes (184 of FIG. 7) receiving the first response from the source processor node (182 of FIG. 7) are operative to fill a copy of the data received from at least one of the other processor nodes and from system memory (188 of FIG. 7; Par. [00103]).

U. Claim 21

Claim 21 is directed to the system (220 of FIG. 9) of claim 18, wherein the source processor node (222 of FIG. 9) provides the second response in response to the source processor node (222 of FIG. 9) receiving a request for the data that conflicts with the source broadcast request for the data after migration of the copy of the data to the source processor node (222 of FIG. 9) has begun (Par. [00110]).

V. Claim 22

Claim 22 is directed to the system (180 of FIG. 7) of claim 21, wherein one of the other processor nodes (184 of FIG. 7) comprises a second processor node (182 of FIG. 7) that provides a respective one of the other source broadcast requests for the data and receives the second response from the first node (182 of FIG. 7; Par. [00102]). The second processor node (184 of FIG. 7) being operative to employ a copy of the data received from a third node (188 of FIG. 7) for a single use (Par. [00103]).

W. Claim 23

Claim 23 is directed to the system (220 of FIG. 9) of claim 21, wherein one of the other processor nodes (224 of FIG. 9) comprises a second processor node (224 of FIG. 9) that provides one of the other source broadcast requests for the data according to broadcast-based protocol (Par. [00110]). The second processor node (224 of FIG. 9) is operative to employ a forward progress

technique to obtain the data in response to the second response from the first node (222 of FIG. 9; Par. [00111]).

X. Claim 24

Claim 24 is directed to the system (220 of FIG. 9) of claim 23, wherein the forward progress technique comprises a forward progress cache coherency protocol (Pars. [0029] and [00111]).

Y. Claim 25

Still yet another aspect of the invention as recited in claim 25 is directed to a system (10 of FIG. 1, 50 of FIG. 4, 100 of FIG. 5, 160 of FIG. 6, 180 of FIG. 7, 200 of FIG. 8, 220 of FIG. 9, 240 of FIG. 10) comprising means for broadcasting a source broadcast request for data from a first node (12 of FIG. 1, 54 of FIG. 4, 102 of FIG. 5, 162 of FIG. 6, 182 of FIG. 7, 202 of FIG. 8, 222 of FIG. 9, 242 of FIG. 10; Pars. [0047], [0080], [0093], [0098], [00100], [00105], [00108], [00112]). The system (10 of FIG. 1, 50 of FIG. 4, 100 of FIG. 5, 160 of FIG. 6, 180 of FIG. 7, 200 of FIG. 8, 220 of FIG. 9, 240 of FIG. 10) further comprising means for issuing from the first node (12 of FIG. 1, 54 of FIG. 4, 102 of FIG. 5, 162 of FIG. 6, 182 of FIG. 7, 202 of FIG. 8, 222 of FIG. 9, 242 of FIG. 10) an invalidate line command to other nodes (14 and 20 of FIG. 1, 56, 58 and 60 of FIG. 4, 104 and 106 of FIG. 5, 184 of FIG. 7, 204 of FIG. 8, 224 of FIG. 9, 244 of FIG. 10) of the system (10 of FIG. 1, 50 of FIG. 4, 100 of FIG. 5, 180 of FIG. 7, 200 of FIG. 8, 220 of FIG. 9, 240 of FIG. 10) in response to receiving a conflict response

from at least one other node (14 and 20 of FIG. 1, 56, 58 and 60 of FIG. 4, 104 and 106 of FIG. 5, 184 of FIG. 7, 204 of FIG. 8, 224 of FIG. 9, 244 of FIG. 10) in the system (10 of FIG. 1, 50 of FIG. 4, 100 of FIG. 5, 180 of FIG. 7, 200 of FIG. 8, 220 of FIG. 9, 240 of FIG. 10) and a data response transferring a cache ordering point for the data to the first node (12 of FIG. 1, 54 of FIG. 4, 102 of FIG. 5, 182 of FIG. 7, 202 of FIG. 8, 222 of FIG. 9, 242 of FIG. 10; Pars. [0042], [0082], [0095], [00101], [00107], [00109], [00113]).

Z. Claim 26

Claim 26 is directed to the system (10 of FIG. 1, 50 of FIG. 4, 100 of FIG. 5, 160 of FIG. 6, 180 of FIG. 7, 200 of FIG. 8, 220 of FIG. 9, 240 of FIG. 10) of claim 25, further comprising means for providing a first conflict response to source broadcast requests for the data from other nodes (224 of FIG. 9) prior to receiving a data response transferring a cache ordering point for the data to the first node (232 of FIG. 9; Par. [00110]). The system further comprising means for providing a second conflict response to source broadcast requests for the data from other nodes (244 of FIG. 10) in response to receiving a data response transferring a cache ordering point for the data to the first node (242 of FIG. 10; Par. [00116]).

AA. Claim 27

Claim 27 is directed to the system (10 of FIG. 1, 50 of FIG. 4, 100 of FIG. 5, 160 of FIG. 6, 180 of FIG. 7, 200 of FIG. 8, 220 of FIG. 9, 240 of FIG. 10) of claim 26, further comprising means for filling a shared copy of the data at one of the other nodes (184 of FIG. 7, 204 of FIG. 8, 224 of FIG. 9) in response to receiving the first conflict response from the first node (182 of FIG. 7, 202 of FIG. 8; Pars. [00102], [00107], [00110]).

AB. Claim 28

Claim 28 is directed to the system (10 of FIG. 1, 50 of FIG. 4, 100 of FIG. 5, 160 of FIG. 6, 180 of FIG. 7, 200 of FIG. 8, 220 of FIG. 9, 240 of FIG. 10) of claim 26, further comprising means for filling a copy of the data received from system memory (16 of FIG. 1, 72 of FIG. 4, 110 of FIG. 5, 168 of FIG. 6, 188 of FIG. 7, 208 of FIG. 8, 228 of FIG. 9, 248 of FIG. 10) at one of the other nodes (184 of FIG. 7, 204 of FIG. 8, 224 of FIG. 9) in response to receiving the first conflict response from the first node (182 of FIG. 7, 202 of FIG. 8; Pars. [00102], [00107], [00110]).

AC. Claim 29

Claim 29 is directed to the system (10 of FIG. 1, 50 of FIG. 4, 100 of FIG. 5, 160 of FIG. 6, 180 of FIG. 7, 200 of FIG. 8, 220 of FIG. 9, 240 of FIG. 10) of claim 26, further comprising means for employing a shared copy of the data for a single use at one of the other nodes (184 of FIG. 7) in response to the one of

the other nodes (184 of FIG. 7) receiving the second conflict response from the first node (184 of FIG. 7; Par. [00103]).

AD. Claim 30

Claim 30 is directed to the system of (10 of FIG. 1, 50 of FIG. 4, 100 of FIG. 5, 160 of FIG. 6, 180 of FIG. 7, 200 of FIG. 8, 220 of FIG. 9, 240 of FIG. 10) claim 26, further comprising means for employing a forward progress technique at one of the other nodes (204 of FIG. 8, 224 of FIG. 9) to obtain the data in response to receiving the second conflict response from the first node (202 of FIG. 8, 222 of FIG. 9; Pars. [00107], [00111]).

AE. Claim 31

An additional aspect of the invention as recited in claim 31 is directed to a system (10 of FIG. 1, 50 of FIG. 4, 100 of FIG. 5, 160 of FIG. 6, 180 of FIG. 7, 200 of FIG. 8, 220 of FIG. 9, 240 of FIG. 10) comprising means for broadcasting a source broadcast request for data from a first node (12 of FIG. 1, 54 of FIG. 4, 102 of FIG. 5, 162 of FIG. 6, 182 of FIG. 7, 202 of FIG. 8, 222 of FIG. 9, 242 of FIG. 10; Pars. [0047], [0080], [0093], [0098], [00100], [00105], [00108], [00112]). The system also comprises means for providing from the first node (232 of FIG. 9) a first conflict response to other source broadcast requests for the data from other nodes (224 of FIG. 9) while the source broadcast for the data is pending at the first node (232 of FIG. 9, Par. [00110]). The system further comprises means for providing a second conflict response to the other source

broadcast requests for the data from the other nodes (244 of FIG. 10) after receiving an ownership data response at the first node (242 of FIG. 10) while the source broadcast for the data is pending at the first node (242 of FIG. 10), the ownership data response comprising a copy of the data (242 of FIG. 10; Par. [00116]).

AF. Claim 32

Claim 32 is directed to the system (10 of FIG. 1, 50 of FIG. 4, 100 of FIG. 5, 160 of FIG. 6, 180 of FIG. 7, 200 of FIG. 8, 220 of FIG. 9, 240 of FIG. 10) of claim 31, further comprising means for cleaning-up incorrect copies of the data and stale copies of the data (12 of FIG. 1, 54 of FIG. 4, 102 of FIG. 5, 182 of FIG. 7, 202 of FIG. 8, 222 of FIG. 9, 242 of FIG. 10) filled at other nodes (14 and 20 of FIG. 1, 56, 58 and 60 of FIG. 4, 104 and 106 of FIG. 5, 184 of FIG. 7, 204 of FIG. 8, 224 of FIG. 9, 244 of FIG. 10) of the system (10 of FIG. 1, 50 of FIG. 4, 100 of FIG. 5, 180 of FIG. 7, 200 of FIG. 8, 220 of FIG. 9, 240 of FIG. 10) in response to receiving the ownership data response at the first node (12 of FIG. 1, 54 of FIG. 4, 102 of FIG. 5, 182 of FIG. 7, 202 of FIG. 8, 222 of FIG. 9, 242 of FIG. 10; Pars. [0042], [0082], [0095], [00101], [00107], [00109], [00113]).

AG. Claim 33

Claim 32 is directed to the system (10 of FIG. 1, 50 of FIG. 4, 100 of FIG. 5, 160 of FIG. 6, 180 of FIG. 7, 200 of FIG. 8, 220 of FIG. 9, 240 of FIG. 10) of claim 31, further comprising means for issuing an invalidate line command (12

of FIG. 1, 54 of FIG. 4, 102 of FIG. 5, 182 of FIG. 7, 202 of FIG. 8, 222 of FIG. 9, 242 of FIG. 10) to the other nodes (14 and 20 of FIG. 1, 56, 58 and 60 of FIG. 4, 104 and 106 of FIG. 5, 184 of FIG. 7, 204 of FIG. 8, 224 of FIG. 9, 244 of FIG. 10) of the system (10 of FIG. 1, 50 of FIG. 4, 100 of FIG. 5, 180 of FIG. 7, 200 of FIG. 8, 220 of FIG. 9, 240 of FIG. 10) in response to receiving the ownership data response at the first node (12 of FIG. 1, 54 of FIG. 4, 102 of FIG. 5, 182 of FIG. 7, 202 of FIG. 8, 222 of FIG. 9, 242 of FIG. 10; Pars. [0042], [0082], [0095], [00101], [00107], [00109], [00113]).

AH. Claim 34

Still yet another aspect of the invention as recited in claim 34 is directed to a method comprising migrating (300 of FIG. 11) a line of data and a cache ordering point for the line of data from a first node of a system to a second node of the system (Par. [00117]). The method further comprising issuing an invalidate line command (310 of FIG. 11) for the line of data from the second node to other nodes of the system in response to receiving a conflict response from at least one other node in the system and to the cache ordering point migrating from the first node to the second node (Par. [00117]).

AI. Claim 35

Claim 35 is directed to the method of claim 34 further comprising providing a first conflict response from the second node (222 of FIG. 9) to requests for the line of data from the other nodes (224 of FIG. 9) of the system (220 of FIG. 9)

prior to the cache ordering point migrating from the first node (226 of FIG. 9) to the second node (222 of FIG. 9; Par. [00110]). The method further providing a second conflict response from the second node (242 of FIG. 10) to requests for the line of data from the other nodes (244 of FIG. 10) after the cache ordering point migrates from the first node (246 of FIG. 10) to the second node (242 of FIG. 10; Par. [00115]).

AJ. Claim 36

Claim 36 is directed to the method of claim 35, further comprising enabling a shared copy of the line of data to be filled at one of the other nodes (184 of FIG. 7) of the system (184 of FIG. 7) in response to receiving the first conflict response from the second node (182 of FIG. 7) and a data response from at least another node of the system (188 of FIG. 7; Par. [00102]). The method further enabling a copy of the line of data received from system memory (188 of FIG. 7) to be filled at one of the other nodes (184 of FIG. 7) of the system (180 of FIG. 7) in response to receiving the first conflict response from the second node (182 of FIG. 7; Par. [00102]).

AK. Claim 37

Claim 37 is directed to the method of claim 35, further comprising enabling a shared copy of the line of data to be filled at least one of the other nodes (184 of FIG. 7) of the system (184 of FIG. 7) for a single use by the at least one of the

other nodes (184 of FIG. 7) of the system (184 of FIG. 7) in response to receiving the second conflict response from the first node (186 of FIG. 7; Par. [00103]).

AL. Claim 38

Claim 38 is directed to the method of claim 35, further comprising employing a forward progress technique at the other nodes (224 of FIG. 9) to fill the cache line in response to receiving the second conflict response from the first node (222 of FIG. 9; Par. [00111]).

AM. Claim 39

Still yet a further aspect of the invention, as recited in claim 34 is directed to a method of providing a first conflict response (350 of FIG. 12) from a first node to source broadcast requests for data from other nodes while a source broadcast request for the data is pending at the first node (Par. [00118]). The method further includes providing a second conflict response (360 of FIG. 12) from the first node to the other source broadcast requests for the data from the other nodes in response to receiving a conflict response and an ownership data response at the first node (Par. [00118]).

AN. Claim 40

In yet another aspect of the invention as recited in claim 40, a computer system (10 of FIG. 1) comprising a plurality of nodes (12, 14 and 20 of FIG. 10), the plurality of nodes(12, 14 and 20 of FIG. 10) employing a cache coherency protocol operative to migrate a cache ordering point for a line of data from a

target node (14 of FIG. 1) to a source node (12 of FIG. 1) in response to a source broadcast read request for the line of data issued by the source node (12 of FIG. 1; Par. [0042]). The source node (12 of FIG. 1) being operative to invalidate the line of data at other nodes (20 of FIG. 1) of the computer system in response to receiving a conflict response and migratory data to the source broadcast read request (Par. [0061]).

VII. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Whether claims 1-9, 12-14, 16-22, 25-29, 31-37 and 39-40 are anticipated by Arimilli.

B. Whether claims 10-11, 23-24, 30 and 38 are made obvious by Arimilli in view of Arimilli 2.

C. Whether claim 15 is made obvious by Arimilli in view of Arimilli 2 and in further view of Martin.

VIII. ARGUMENT

A. 35 U.S.C. §102(b) rejection of claims 1-9, 12-14, 16-22, 25-29, 31-37 and 39-40 as being anticipated by Arimilli

Anticipation by a single reference requires that the single prior art reference disclose each and every element of the claimed invention, arranged as in the claim. *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1458, 221 U.S.P.Q. 481, 485 (Fed. Cir. 1984).

1. The Anticipation Rejection of Claim 1

Claim 1 is not anticipated by Arimilli. Arimilli fails to disclose a first node that provides a source broadcast request for data, as recited in claim 1. In rejecting claim 1, the Final Action contends that paragraphs [0035]-[0038] of Arimilli disclose this element of claim 1 (See Final Action, Page 3). However, contrary to the characterization of Arimilli in the Final Action, Arimilli as a whole discloses a data processing system and method for resolving a conflict between requests to modify a shared cache line (See Arimilli, Abstract). That is, the approach disclosed in Arimilli at paragraphs [0035]-[0038] (in describing FIGS. 3A and 3B) and in Arimilli, more generally, relates to how conflicts between requests of multiple agents to modify a target cache line already in a shared state are arbitrated by the coherency decision point (CDP) and how

ownership of the cache line granted by the CDP is protected (See Arimilli, Par. [0034]).

The particular reliance on paragraph [0036] relating to the "master 26 preventing access to the target cache line by other agents...until the store in the cache array is completed" similarly appears misplaced. Reference to paragraph [0036] of Arimilli demonstrates a particular scenario in which the cache line has the modified or exclusive state in which the "master 26 simply performs the store into cache array 24 without issuing a transaction on the system bus and, if appropriate, updates cache directory 22" (See Arimilli, Par. [0036]). Accordingly, such a section of Arimilli and its disclosure of preventing access to the target cache line does not involve any source broadcast request for data, as recited in claim 1. Instead, in Arimilli the data is already in a modified or exclusive state in the cache of the agent issuing the transaction (See Arimilli, Par. [0036]). The remaining sections of Arimilli cited in the Final Action relate to other specific scenarios when the target cache line is held by the cache 14 in a shared state or a shared-owner state (See Arimilli, Pars. [0037]-[0038]), such that, there would be no reason to issue a source broadcast request for the data, as recited in claim 1, since in Arimilli, such data is already at the master 26 that issues the transaction.

Additionally, in paragraph [0012], Arimilli discloses that while data associated with a target address "are cached at a first agent among the plurality

of agents in a shared state, the first agent issues a transaction on the interconnect." Since the first agent in the cited section of Arimilli already has the data cached, such first agent would not issue a source broadcast request for data already in its cache. Such a reading of Arimilli is supported in paragraph [0012] of Arimilli, which discloses that the CDP provides a snoop response granting the first agent ownership of the data that is already cached at the first agent. Therefore, the first agent disclosed in Arimilli cannot read on the first node recited in claim 1, since the first node recited in claim 1 provides a source broadcast request for data.

In the Final Action, it is argued that one of ordinary skill would recognize a request with intent to modify (RWITM) transaction (as disclosed in Arimilli) as a source broadcast request for data in a shared cache memory system (See Final Response, Page 24). Applicant's representative respectfully disagrees. A limitation is inherently disclosed by a reference only if it is necessarily present and a person of ordinary skill in the art would recognize its presence. *Crown Operations Int'l Ltd. v. Solutia Inc.*, 289 F.3d 1367, 1377, 62 U.S.P.Q..2d 1917, 1922-1923 (Fed. Cir. 2002). Applicant's representative respectfully submits that Arimilli fails to disclose the employment of a source broadcast request for data, such as recited in claim 1. Further, Applicant's representative respectfully submits that numerous methods for requesting cache data exist, such as a directory based point-to-point system that would not necessitate the use of a

source broadcast request for data. Accordingly, applicant's representative respectfully submits that a first node that provides a source broadcast for data, as recited in claim 1, is neither explicitly nor inherently disclosed in Arimilli.

Further, claim 1 recites that the first node can respond in a first manner while the source broadcast request for the data is pending at the first node and in a second manner in response to receiving an ownership data response. The Final Action contends that paragraphs [0012] and [0035]-[0038] of Arimilli disclose this element of claim 1. Applicant's representative respectfully disagrees. In particular, the cited sections of Arimilli in the Final Action (and Arimilli as a whole), do not disclose the first and second manners of responding, as recited in claim 1.

Arimilli fails to disclose that the first node is operable to respond to other source broadcast requests for the data while the transaction is pending, as recited in claim1. Instead, Arimilli explicitly states that the CDP - NOT the first agent - protects the grant of ownership until the combined response is received by the first agent (See Arimilli, Par. [0013]). According to Arimilli, it is only after the first agent receives the combined response granting ownership of the target cache line that the first agent can assume responsibility for protecting its ownership of the data (See, e.g., Arimilli, Par. [0033], which explains that the CDP and not the agent itself provide responses to deny ownership to other agents that issue conflicting transactions). Such an approach (as disclosed in

Arimilli) conflicts with the approach recited in claim 1, since in claim 1, the first node is operable to respond in a first manner to other source broadcast requests for the data while the source broadcast request for the data is pending at the first node (emphasis added).

In the Final Action, it is argued that Arimilli discloses that during interval 164 between a receipt of a combined response 154a and the close of interval 160, a processor complex 10a can protect its ownership by providing a snoop response (See Final Action, Page 24). Applicant's representative respectfully submits that in Arimilli, after the combined response 154a is received by the processor complex 10a, that the request (which is not a broadcast request) for the data is no longer pending. Thus, Applicant's representative respectfully submits that Figure 2 of Arimilli actually demonstrates the differences between claim 1 and Arimilli, since claim 1 recites that a first node is operable to respond in a first manner to other source broadcast requests for the data while the source broadcast request (issued by the first node) is pending at the first node, whereas Figure 2 of Arimilli (along with the supporting specification) states that until the combined response 154a is received by the processor, that the CDP protects ownership of a target cache (See Arimilli, FIG. 2 and Par. [0033]).

Further still, Arimilli fails to disclose that an ownership data response is received at a first node, as recited in claim 1. In contrast to the system recited in claim 1, Arimilli discloses that the CDP provides a snoop response "granting

ownership" to the already cached line of data of the first agent (See Arimilli, Pars. [0012], and [0034] to [0038]). In Arimilli, the snoop response is not a "data response" as would be understood by one of ordinary skill of the art and as such term is consistently used in the present application and as recited in claim 1. In particular, claim 1 recites that an ownership data response includes a copy of the data. Moreover, see also paragraph [0047] of the present application for examples of data responses.

In the Final Action it is argued that Arimilli discloses a master 26 issuing a request for data (an RWITM request), and thus discloses a first node receiving an ownership data response, as recited in claim 1 (See Final Action, pages 25-26). Applicant's representative respectfully submits that the Final Action fails to show a first node (which the Final Action appears to contend corresponds to the master 26) receiving an ownership data response comprising a copy of data, as recited in claim 1 (emphasis added). Instead, the Final Action merely argues that the master 26 issues a request for data.

The differences in the disclosure of Arimilli from what is recited in claim 1 are further revealed when considering the purpose of Arimilli, which is to arbitrate between conflicting requests to modify data cached in a shared state (See Arimilli, Abstract). As a consequence of Arimilli failing to disclose that an ownership data response is received at the first node, as recited in claim 1, there is no basis to conclude that the first agent in the system of Arimilli would respond

in the second manner, as recited in claim 1. Thus, the first agent does not read on the first node recited in claim 1.

For the reasons stated above, Arimilli fails to disclose each and every element of claim 1. Accordingly, Arimilli does not anticipate claim 1, and Applicant's representative respectfully requests that the rejection of claim 1 be withdrawn.

2. The Anticipation Rejection of Claim 2

Claim 2 depends from claim 1 and is not anticipated for at least the same reasons as claim 1, and for the specific elements recited therein. Accordingly, withdrawal of the rejection of claim 2 is respectfully requested.

3. The Anticipation Rejection of Claim 3

Claim 3 depends from claim 1 and is not anticipated for at least the same reasons as claim 1, and for the following reasons. Claim 3 recites that migratory data comprises a cache ordering point for serializing a source broadcast request for the data. In rejecting claim 3, the Final Action states that the CDP provides a snoop response to grant the first agent ownership of the data (See Final Action, at page 4, Par. 9). The rejection of claim 3, however, fails to address the concept of a cache ordering point and its migration, as recited in claim 3, but instead erroneously focuses on non-data clean-up transactions and responses (as

described in Arimilli) in the context of when the target cache line exists in the shared-owner state (See Final Action, Pages 4-5, citing Par. [0038] of Arimilli). However, nothing in the cited section of Arimilli (or elsewhere in Arimilli) discloses the recited cache ordering point migration in which the ordering point migrates to the first node (which provided the source broadcast request for the data) from a node that provided the ownership data response, as recited in claim 3.

In the Final Action, it is argued that since Arimilli discloses that a master 26 obtains a copy of a cache line from another agent 10, that Arimilli discloses claim 3. (See Final Action, Pages 26-27) Applicant's representative respectfully disagrees. As illustrated in Figure 3B of Arimilli, a master 26 initiates a read with intent to modify transaction on a system bus 12, and the master 26 receives a combined response (CR) (See Arimilli, FIG. 3B). Arimilli also discloses that a response logic 30 compiles snoop responses to each transaction placed on the system bus 12 to produce the CR (See Arimilli, Par. [0053]). Arimilli is completely devoid of any teaching (or even a suggestion) that response logic 30 or other structure (e.g., node that provides an ownership data response) causes a cache ordering point to migrate to the master 26 (e.g., first node). Therefore, the master 26 disclosed in Arimilli does not read on the first node recited in claim 3, and the response logic 30 does not correspond to the node that provides the ownership data response recited in claim 3. For at least these reasons,

claim 3 is not anticipated by Arimilli. Accordingly, withdrawal of the rejection of claim 3 is respectfully requested.

4. The Anticipation Rejection of Claim 4

Claim 4 depends from claims 3 and 1 and is not anticipated for at least the same reasons as claims 3 and 1 and for the following reasons. Arimilli fails to disclose that a first node (that received the ownership data response in claim 1, from which claim 4 depends) is operative to provide an ownership data response to a second node requesting the data, such that the ordering point migrates from the first node to the second node. As discussed above with respect to claim 3, Arimilli fails to disclose both the concept of a cache ordering point and that such a cache ordering point can migrate, as recited in claim 4. Thus, Arimilli does not anticipate claim 4. Accordingly, Applicant's representative respectfully requests that the rejection of claim 4 be withdrawn.

5. The Anticipation Rejection of Claim 5

Claim 5 depends from claim 1 and is not anticipated for at least the same reasons as claim 1, and for the following reasons. Claim 5 recites that a first node (that issued a broadcast request) provides a first response to other source broadcast requests for data indicating that the first node has a conflicting read request for the data. In sharp contrast to claim 5, Arimilli discloses resolving

conflicts between shared cache lines which already have copies of the data using a CDP that issues ownership snoop responses granting ownership. Nothing in Arimilli describes the transaction issued by the agent as being a source broadcast request. Instead, the transaction is described as a request for ownership of shared cache line, such as may be either a shared state or a shared-owner state (See Arimilli, FIGS. 3A-3B and corresponding description).

As stated above with respect to claim 1, from which claim 5 depends, the first manner of response is provided by the first node while a source broadcast request for data is pending at the first node. In contrast to the approach recited in the system of claim 5, Arimilli discloses that the CDP protects ownership of data until a combined response is received by a processor complex 10a (See Arimilli, FIG. 1 and Par. [0033]). Accordingly, since Arimilli fails to disclose that any response is provided by the processor complex 10a before the combined response 154a is provided, Arimilli cannot disclose the particular details of such a response (e.g., the elements recited in claim 5). For these reasons, Arimilli fails to anticipate claim 5. Accordingly, Applicant's representative respectfully requests that the rejection of claim 5 be withdrawn.

6. <u>The Anticipation Rejection of Claims 6</u>

Claim 6 depends from claims 5 and 1 and is not anticipated for at least the same reasons as claims 5 and 1, and for the following reasons. Arimilli does not

disclose a second node that provides one of the other source broadcasts (of claim 1, from which claim 6 depends) and receives a first response from the first node, is operative to fill a shared copy of data received from a third node in response to one of the other source broadcast requests for the data, as recited in claim 6. The Final Action contends that paragraph [0029] of Arimilli discloses claim 6. Applicant's representative respectfully disagrees. The cited section of Arimilli discloses that if a conflict arises during interval 160, the master 26 of a second agent 10 manifests an intention to modify the target cache line (See Arimilli, Par. [0029]). However, the cited section of Arimilli (or any other section) fails to disclose that second agent 10 is operative to fill a shared copy of data received from a third node in response to one of the other source broadcast requests for the data, in contrast to the second node recited in claim 6.

Instead, Arimilli discloses that if a CDP responds to a Dclaim transaction with a negative acknowledgement (NACK) because another agent 10 has previously been granted ownership of the cache line, response logic 30 provides a retry read with the intent to modify combined response (RETRY_RWTIM CR) (See Arimilli, Par. [0056]). Arimilli also discloses that the RETRY_RWTIM CR signifies that initiator agent 10 must issue a RWITM on the system bus 12 to gain ownership of an updated copy of the cache line from the agent 10 that is the new owner (See Arimilli, Par. [0056]). There is nothing in Arimilli to indicate that a second node is operative to fill a shared copy of data received from a third node

in response to one of the other source broadcast requests for the data, as recited in claim 6, since in Arimilli, an initiator agent 10 must gain ownership of an updated copy of a cache line from the agent 10 that is the new owner. Accordingly, Arimilli does not anticipate claim 6. Thus, Applicant's representative respectfully requests that the rejection of claim 6 be withdrawn.

7. The Anticipation Rejection of Claim 7

Claim 7 depends from claims 5 and 1 and is not anticipated for at least the same reasons as claims 5 and 1, and for the specific elements recited therein. Accordingly, Applicant's representative respectfully requests that the rejection of claims 7 be withdrawn.

8. The Anticipation Rejection of Claim 8

Claim 8 depends from claim 1 and is not anticipated for at least the same reasons as claim 1, and for the following reasons. In contrast to claim 8, Arimilli fails to disclose that any response might indicate that migration of the copy of the data to the first node is in progress. As discussed above with respect to claim 1, from which claim 8 depends, in Arimilli, the CDP protects ownership of data until combined response 154a is received by a processor complex 10a (See Arimilli, FIG. 2 and Par. [0033]). Additionally, in Arimilli, after the combined response 154a is received in the processor complex 10a, the processor complex 10a can

protect its ownership of a target cache by providing appropriate snoop responses (See Arimilli, Par. [0033]). However, Arimilli does not disclose that such appropriate snoop responses could be an indication of a conflicting request for the data and that migration of the data to the first node is in progress, in contrast to the second response recited in claim 8 (emphasis added). Thus, since Arimilli fails to disclose the data that is included with the aforementioned "appropriate snoop responses," Arimilli cannot anticipate claim 8. Accordingly, Applicant's representative respectfully requests that the rejection of claim 8 be withdrawn.

9. The Anticipation Rejection of Claim 9

Claim 9 depends from claims 8 and 1, and is not anticipated for at least the same reasons as claims 8 and 1, and for the following reasons. Arimilli fails to disclose that a second node is operative to employ a copy of the data received from a third node for only a single use, as recited in claim 9. In rejecting claim 9, the Final Action seems to misread what is claimed, suggesting that coherency protocols typically require that only a single agent can own each line at a given time for purposes of modification (See Final Action, Page 7). However, claim 9 does not recite (explicitly or implicitly) that the second node "owns" the copy of data received from a third node as appears to be suggested in the Final Action. While Arimilli may state that only a single agent can own each cache line for purposes of modification (See Arimilli, Par. [0033]), Arimilli is silent regarding

employing a copy of data for a single use, as recited in claim 9. Thus, Arimilli does not anticipate claim 9, and Applicant's representative respectfully requests that the rejection of claim 9 be withdrawn.

10. The Anticipation Rejection of Claims 12-14

Claims 12-14 depend either directly or indirectly from claim 1 and are not anticipated for at least the same reasons as claim 1, and for the specific elements recited therein. Accordingly, applicant's representative respectfully requests that the rejection of claims 12-14 be withdrawn.

11. The Anticipation Rejection of Claim 16

Arimilli does not anticipate claim 16. Arimilli fails to disclose that a source processor provides a source broadcast read request for data, as recited in claim 16. In rejecting claim 16, the Final Action contends that paragraphs [0012] and [0035]-[0038] of Arimilli discloses claim 16 (See Final Action, Page 9). Applicant's representative respectfully submits that the reliance on the cited sections of Arimilli do not support the Examiner's position. In particular, paragraph [0012] in the Summary section of Arimilli relates to a particular type of transaction when a first agent, which already has a shared copy data associated with a target address cached at the first agent, issues a transaction. Since the data is already cached at the first agent, the transaction would be understood as

not being a broadcast read request. Moreover, nothing in paragraph [0012] of Arimilli teaches that the invalidation of other cached copies of the data occurs in response to the condition recited in claim 16. Instead, since the first agent already has a shared copy of the data in its cache, the first agent does not receive a data response that includes a copy of the data. Since there is no data response, as recited in claim 16, there consequently would be no data response that also transfers a cache ordering point to the first agent. The differences between claim 16 and the teachings of Arimilli are further revealed upon reference to the other sections of Arimilli relied on in the rejection of claim 16.

For example, paragraph [0036] of Arimilli describes a master 26 preventing access to a target cache by other agents until a store operation is completed. Such a section of Arimilli does not describe a source broadcast read request for data, as recited in claim 16, since, in the cited section of Arimilli, the stored data is already in a modified or exclusive state in the cache of the agent issuing the transaction and therefore simply performs the store without issuing a transaction on the bus (See Arimilli, Par. [0036]).

The remaining cited sections of Arimilli also relate to scenarios when a target cache line is held by a cache 14 in a shared state or a shared-owner state (See Arimilli, Pars. [0037]-[0038]), such that there would be no reason whatsoever to issue a source broadcast request for the data, as recited in claim 16. That is, since (in Arimilli) the target cache line is already in the cache

14, there would be not reasonable basis to issue a source broadcast read request for the already cached data. Thus master 26, disclosed in Arimilli cannot read on the source processing node recited in claim 16.

A comprehensive review of Arimilli further demonstrates that each instance in which a master issues kill transactions to invalidate cache line copies held by other agents occurs in response to receiving a combined response (CR) (See Arimilli at Par. [0012], [0037], [0057], [0058] and [0062]). Many of these and other instances (see Arimilli at Par. [0038]) further relate to scenarios when the agent or master that issues the transaction already has the data in the shared or shared-owner state. Significantly, the combined response described in Arimilli is not a data response as recited in claim 16, but instead is compilation of snoop responses (see Arimilli at Par. [0053] and Table III defining the combined responses). Significantly, Arimilli describes that CR are issued for RWITM and Dclaim transactions only, which as discussed above are not source broadcast read requests for data, as recited in claim 16. Instead, these transactions are specifically used to gain exclusive access to data prior to modifying a locally cached copy (Arimilli at Par. [0006]).

It should be appreciated that, in contrast to the approach described in Arimilli, claim 16 provides a system in which a node provides a source broadcast read request and receives data response that transfers both a copy of the requested data and a cache ordering point for the data. Responsive to this data

response (transferring both a copy of the data and the ordering point), the source processor node issues an invalidate command. Such features are not taught or event suggested in Arimilli.

As a further example, in sharp contrast to claim 16, as illustrated in Figure 3B of Arimilli, a master 26 initiates a read with intent to modify transaction on a system bus 12, and the master 26 receives a combined response (See Arimilli, FIG. 3B). Arimilli also discloses that a response logic 30 compiles snoop responses to each transaction placed on the system bus 12 to produce the combined response (See Arimilli, Par. [0053]). Therefore, the master 26 disclosed in Arimilli does not correspond to the source node recited in claim 16 because Arimilli fails to disclose that the response logic 30 or other mechanism causes a cache ordering point to transfer to a source node with a data response, in contrast to the system recited in claim 16. Since Arimilli does not teach receiving a data response of the type recited in claim 16, Arimilli likewise fails to teach that the source processor node issues an invalidate command in response to receiving such a data response, as recited in claim 16.

For at least the reasons stated above, Arimilli does not anticipate claim 16. Accordingly, Applicant's representative respectfully requests that the rejection of claim 16 be withdrawn.

12. The Anticipation Rejection of Claim 17

Claim 17 depends from claim 16 and is not anticipated for at least the same reasons as claim 16, and for the specific elements recited therein. Accordingly, withdrawal of the rejection of claim 17 is respectfully requested.

13. The Anticipation Rejection of Claim 18

Claim 18 depends from claim 16 and is not anticipated for at least the same reasons as claim 16 and for the following reasons. Arimilli fails to disclose that a first processor node is operative to provide a first conflict response to source broadcast requests for the data from other processor nodes prior to receiving the data response that transfers the ordering point for the data to the source processor node, as recited in claim 18. Instead, the approach taken in Arimilli explicitly employs a CDP that provides snoop responses to deny ownership to conflicting transactions during the interval from issuing a transaction to modify a shared cache line until the agent is informed of the grant of ownership (See Arimilli, FIG. 2 and Par. [0033]). Accordingly, Arimilli fails to disclose claim 18, since in Arimilli, the CDP protects ownership of data until a processor complex 10a receives a combined response 154a (See Arimilli, Par. [0033]). In contrast, claim 18 recites that the first conflict response is provided (from the source processing node) prior to receiving the data response (emphasis added). Accordingly, Arimilli does not anticipate claim 18. Thus,

Applicant's representative respectfully requests that the rejection of claim 18 be withdrawn.

14. The Anticipation Rejection of Claim 19

Claim 19 depends from claim 18 and is not anticipated for at least the same reasons as claim 18, and for the following reasons. Similar to claim 18, from which claim 19 depends, Arimilli fails to disclose that a processor node provides any response to source broadcast requests for the data from other nodes, especially not source broadcast read requests, as recited in claim 19. Instead, Arimilli utilizes the CDP to protect ownership during the interim until ownership as been granted to an agent issuing a transaction (See Arimilli, Par. [0033]). Accordingly, since Arimilli fails to disclose that an agent can provide a response to a source broadcast request when the agent has a pending conflicting read request for the data, in contrast to the source processor recited in claim 19, Arimilli cannot anticipate claim 19. Accordingly, Applicant's representative respectfully requests that the rejection of claim 19 be withdrawn.

15. The Anticipation Rejection of Claim 20

Claim 20 depends from claims 19, 18 and 16 and is not anticipated for at least the same reasons as claims 19, 18 and 16 and for the following reasons. In rejecting claim 20, the Final Action relies on the rejection of claim 6 (See Final

Action, Page 12). Applicant's representative respectfully submits that Arimilli does not disclose that other processor nodes receive a first response from a source processor node are operative to fill a copy of data received from at least one of the other processor nodes and from system memory, as recited in claim 20. Instead, Arimilli discloses that if a CDP responds to a Dclaim transaction with a negative acknowledgement (NACK) because antoher agent 10 has previously been granted ownership of the cache line, response logic 30 provides a retry read with the intent to modify combined response (RETRY_RWTIM CR) (See Arimilli, Par. [0056]). Arimilli also discloses that the RETRY_RWTIM CR signifies that initiator agent 10 must issue a RWITM on the system bus 12 to gain ownership of an updated copy of the cache line from the agent 10 that is the new owner (See Arimilli, Par. [0056]).

There is nothing in Arimilli to indicate that another processor node is operative to fill a shared copy of data received from at least one of the other processor nodes and from system memory, as recited in claim 20. This is because, in Arimilli, an initiator agent 10 must gain ownership of an updated copy of a cache line from the agent 10 that is the new owner (Arimilli, Par. [0056]) and the other agents caching the same cache line have already invalidated or will invalidate their copies of the cache line (Arimilli, Par. [0057]). Accordingly, Arimilli does not anticipate claim 20, and Applicant's representative respectfully requests that the rejection of claim 20 be withdrawn.

16. The Anticipation Rejection of Claim 21

Claim 21 depends from claims 18 and 16, and is not anticipated for at least the same reasons as claims 18 and 16, and for the specific elements recited therein. Accordingly, Applicant's representative respectfully requests that the rejection of claim 21 be withdrawn.

17. The Anticipation Rejection of Claim 22

Claim 22 depends from claims 18 and 16 and is not anticipated for at least the same reasons as claims 18 and 16 and for the following reasons. Arimilli fails to disclose a second processor node being operative to employ a copy of the data received from a third node for a single use, as recited in claim 22. In rejecting claim 22, the Final Action relies on the rejection of claim 9 (See Final Action, Pages 13-14). In the rejection of claim 9, the Final Action cites paragraph [0033] of Arimilli for disclosing that coherency protocols typically requires that only a single agent can own each line at a given time for purposes of modification (See Final Action, Page 7). Applicant's representative respectfully submits that such a reliance on the cited section of paragraph [0033] of Arimilli illustrates that claim 22 has been misconstrued. While Arimilli may state that only a single agent can own each cache line for purposes of modification (See Arimilli, Par. [0033]), Arimilli is silent regarding employing a copy of data for a single use,

as recited in claim 22. Thus, Arimilli does not anticipate claim 22, and Applicant's representative respectfully requests that the rejection of claim 22 be withdrawn.

18. The Anticipation Rejection of Claim 25

Arimilli does not anticipate claim 25. In rejecting claim 25, the Final Action relies on the rejection of claim 16 (See Final Action, Page 14). In rejecting claim 16, the Final Action relies on Paragraphs [0012] and [0035]-[0038] Arimilli. Applicant's representative respectfully submits that the reliance on the cited sections of Arimilli appears to be misplaced. In particular, paragraph [0036] of Arimilli relates to a master 26 preventing access to a target cache by other agents until a store operation is completed. Such a section of Arimilli does not include mention of any means for broadcasting a source broadcast request for data from a first node, as recited in claim 25. In sharp contrast, the cited section of Arimilli describes that the stored data is already in a modified or exclusive state in the cache of the agent issuing the transaction (See Arimilli, Par. [0036]).

The remaining cited sections of Arimilli also relate to scenarios when a target cache line is held by a cache 14 in a shared state or a shared-owner state (See Arimilli, Pars. [0037]-[0038]). Since (in Arimilli) the target cache line is already in the cache 1, there would no reason whatsoever to broadcast a source broadcast request for the data from a first node which results in a data response transferring a cache ordering point for the requested data to the first node, as

recited in claim 25. Thus, Arimilli fails to disclose any structure or process that reads on the means for broadcasting recited in claim 25.

Furthermore, Arimilli is devoid of any teaching (or even a suggestion) of a data response transferring a cache ordering point for data to the first node, as recited in claim 25. Instead, as illustrated in Figure 3B of Arimilli, a master 26 initiates a read with intent to modify transaction on a system bus 12, and the master 26 receives a combined response (See Arimilli, FIG. 3B). Arimilli also discloses that a response logic 30 compiles snoop responses to each transaction placed on the system bus 12 to produce the combined response (See Arimilli, Par. [0053]). The master 26 disclosed in Arimilli does not read on the source node recited in claim 16 because Arimilli fails to disclose that the response logic 30 causes a cache ordering point to transfer to the master, in contrast to the data response recited in claim 25.

Thus, Armilli fails to teach or suggest any mechanism for issuing from a node (that broadcasts a source broadcast request) an invalidate line command in response to receiving the two types of responses recited in claim 25; namely, a conflict response and a data response that also transfers a cache ordering point for the data. As discussed herein, it is the combined response (not a data response) that transfers ownership to a master.

For at least the reasons stated above, Arimilli does not anticipate claim 25. Accordingly, Applicant's representative respectfully requests that the rejection of claim 25 be withdrawn.

19. The Anticipation Rejection of Claim 26

Claim 26 depends from claim 25 and is not anticipated for at least the same reasons as claim 25, and for the specific elements recited therein. Accordingly, Applicant's representative respectfully requests that the rejection of claim 26 be withdrawn.

20. The Anticipation Rejection of Claim 27

Claim 27 depends from claims 26 and 25 and is not anticipated for at least the same reasons as claims 26 and 25 and for the following reasons. In rejecting claim 27, the Final Action relies on the rejection of claim 6 (See Final Action, Page 12). Applicant's representative respectfully submits that Arimilli does not disclose means for filling a shared copy of data at one of the other nodes in response to receiving a first conflict response (provided prior to receiving a data response, as recited in claim 26, from which claim 27 depends) from a first node, as recited in claim 27.

Instead, the approach taken in Arimilli explicitly employs a CDP (e.g., not a first node) that provides snoop responses to deny ownership to conflicting

transactions during the interval from issuing a transaction to modify a shared cache line until the agent is informed of the grant of ownership (See Arimilli, FIG. 2 and Par. [0033]). Thus, Arimilli fails to disclose claim 27, since in Arimilli, the CDP protects ownership of data until a processor complex 10a receives a combined response 154a (See Arimilli, Par. [0033]). In contrast, claim 27 recites (by virtue of claim 27's dependence from claim 26) that the first conflict response is received from a first node prior to receiving the data response (emphasis added). Thus, Arimilli does not anticipate claim 27, and Applicant's representative respectfully requests that the rejection of claim 27 be withdrawn.

21. The Anticipation Rejection of Claim 28

Claim 28 depends from claims 26 and 25 and is not anticipated for at least the same reasons as claims 26 and 25 and for the following reasons. In rejecting claim 28, the Final Action relies on the rejection of claim 6 (See Final Action, Page 12). Applicant's representative respectfully submits that Arimilli does not disclose means for filling a shared copy of data received from system memory at one of the other nodes in response to receiving a first conflict response from a first node, as recited in claim 28.

Instead, the approach taken in Arimilli explicitly employs a CDP (e.g., not a first node) that provides snoop responses to deny ownership to conflicting transactions during the interval from issuing a transaction to modify a shared

cache line until the agent is informed of the grant of ownership (See Arimilli, FIG. 2 and Par. [0033]). Accordingly, Arimilli fails to disclose claim 28, since in Arimilli, the CDP protects ownership of data until a processor complex 10a receives a combined response 154a (See Arimilli, Par. [0033]), while claim 28 recites (by virtue of claim 28's dependence from claim 26) that the first conflict response is received from a first node prior to receiving the data response (emphasis added).

Furthermore, Arimilli discloses that if a CDP (e.g., not the first node) responds to a Dclaim transaction with a negative acknowledgement (NACK) because another agent 10 has previously been granted ownership of the cache line, response logic 30 provides a retry read with the intent to modify combined response (RETRY_RWTIM CR) (See Arimilli, Par. [0056]). Arimilli also discloses that the RETRY_RWTIM CR signifies that initiator agent 10 must issue a RWITM on the system bus 12 to gain ownership of an updated copy of the cache line from the agent 10 that is the new owner (See Arimilli, Par. [0056]). There is no process or structure disclosed in Arimilli that reads on the means for filling a shared copy of data received from system memory at one of the other nodes in response to receiving a first conflict response from the first node, as recited in claim 28. This is because, in Arimilli, an initiator agent 10 must gain ownership of an updated copy of a cache line from the agent 10 (e.g., not system memory) that is the new owner (See Arimilli, Par. [0056]). For these reasons, claim 28 is

not anticipated by Arimilli. Therefore, Applicant's representative respectfully requests that the rejection of claim 28 be withdrawn.

22. The Anticipation Rejection of Claim 29

Claim 29 depends from claims 26 and 25 and is not anticipated for at least the same reasons as claims 26 and 25 and for the following reasons. Arimilli fails to disclose means for employing a shared copy of data for a single use at one of the other nodes in response to the one of the other nodes receiving a second conflict response from a first node, as recited in claim 29. In rejecting claim 29, the Final Action relies on the rejection of claim 9 (See Final Action, Pages 13-14). In the rejection of claim 9, the Final Action cites paragraph [0033] of Arimilli for disclosing that coherency protocols typically requires that only a single agent can own each line at a given time for purposes of modification (See Final Action, Page 7). Applicant's representative respectfully submits that such a reliance on the cited section of Arimilli illustrates that claim 29 has been misconstrued. While Arimilli may state that only a single agent can own each cache line for purposes of modification (See Arimilli, Par. [0033]), Arimilli is silent regarding means for employing a copy of data for a single use, as recited in claim 29. Therefore, Arimilli fails to anticipate claim 29, and Applicant's representative respectfully requests that the rejection of claim 29 be withdrawn.

23. The Anticipation Rejection of Claim 31

Claim 31 is not anticipated by Arimilli. In rejecting claim 31, the Final Action largely relies on the rationale for the rejection of claim 1 (See Final Action, Page 14). In rejecting claim 1, the Final Action cited paragraphs [0012] and [0035]-[0038]. Applicant's representative respectfully submits that the reliance on the cited sections of Arimilli is improper for at least the following reasons.

Arimilli fails to disclose means for broadcasting a source broadcast request for data from a first node, as recited in claim 31. Instead, Arimilli discloses a snooping transaction on the interconnect and that a CDP provides a snoop response granting ownership of the data to the requesting agent (See Arimilli, Par. [0012]). There is nothing in Arimilli that would indicate the request agent provides a source broadcast for data, such that the requesting agent disclosed in Arimilli cannot correspond to the means for broadcasting recited in claim 31.

Additionally, Arimilli fails to disclose means for providing, from the first node, a first conflict response to other source broadcast requests for the data from other nodes while the source broadcast for the data is pending at the first node, as recited in claim 31. In contrast to the system recited in claim 31, in Arimilli, a granting CDP (not the agent or processor complex issuing the transaction) protects ownership by issuing snoop responses until the agent 10 receives grant of ownership (See Arimilli, Par. [0033]). Arimilli fails to disclose

the first conflict response recited in claim 31, since in claim 31, the first conflict response is provided from the first node while a source broadcast for the data is pending at the first node, whereas, in Arimilli, a CDP protects ownership until the agent 10 is granted ownership. Consequently, Arimilli fails to disclose the means for providing from the first node, a first conflict response, as recited in claim 31. Therefore, for at least the reasons stated above, Arimilli fails to anticipate claim 31. Thus, Applicant's representative respectfully requests that the rejection of claim 31 be withdrawn.

24. The Anticipation Rejection of Claims 32-33

Claims 32-33 depend from claim 31 and are not anticipated for at least the same reasons as claim 31 and for the specific elements recited therein. Accordingly, withdrawal of the rejection of claims 32-33 is respectfully requested.

25. The Anticipation Rejection of Claim 34

Claim 34 is not anticipated by Arimilli. In rejecting claim 34, the Final Action largely relies on the rationale for the rejection of claim 1 (See Final Action, Page 16). Applicant's representative respectfully submits that reliance on the sections of Arimilli cited in the rejection of claim 1 is improper. Arimilli does not disclose migrating a line of data and a cache ordering point for the line of data from a first node in a system to a second node in a system, as recited in

claim 34. The rejection of claim 34 fails to address the concept of a cache ordering point and its migration, as recited in claim 34, but instead erroneously focuses on conflict resolution during a time interval 160 disclosed in Arimilli (See Final Action Page 16, citing paragraph [0029] of Arimilli). However, nothing in the cited section of Arimilli (or elsewhere in Arimilli) discloses the recited migrating of a line of data and a cache ordering point for the line of data from a first node of a system to the second node of the system, as recited in claim 34. Consequently, there is no further teaching in Armilli that an invalidate command would be issued from the second node responsive to the particular conditions recited in claim 34; namely, receiving a conflict response from at least one other node and the migration of the cache ordering point to the second node. As discussed above with respect to claim 16, Arimilli fails to teach that an invalidate command occurs in response to such conditions. Accordingly, Arimilli does not anticipate claim 34, and Applicant's representative respectfully requests that the rejection of claim 34 be withdrawn.

26. <u>The Anticipation Rejection of Claim 35</u>

Claim 35 depends from claim 34 and is not anticipated for at least the same reasons as claim 34 and for the following reasons. In rejecting claim 35, the Final Action relies on the rationale for the rejection of claim 18 (See Final Action, Page 11). Applicant's representative respectfully submits that Arimilli fails

to disclose providing a first conflict response from a second node to requests for a line of data from the other nodes of a system prior to a cache ordering point migrating from the first node to the second node, as recited in claim 35.

Instead, the approach taken in Arimilli explicitly employs a CDP that provides snoop responses to deny ownership to conflicting transactions during the interval from issuing a transaction to modify a shared cache line until the agent is informed of the grant of ownership (See Arimilli, FIG. 2 and Par. [0033]). Accordingly, Arimilli fails to disclose claim 35, since in Arimilli, the CDP protects ownership of data until a processor complex 10a receives a combined response 154a (See Arimilli, Par. [0033]), while claim 35 recites that providing a first conflict response from the second node prior to the cache ordering point migrating from the first node to the second node, as recited in claim 35 (emphasis added). Accordingly, Arimilli does not anticipate claim 35. Thus, Applicant's representative respectfully requests that the rejection of claim 35 be withdrawn.

27. The Anticipation Rejection of Claim 36

Claim 36 depends from claims 35 and 34 and is not anticipated for at least the same reasons as claims 35 and 34, and for the following reasons. Arimilli fails to disclose enabling a shared copy of the data to be filled at one of the other nodes of the system in response to receiving a first conflict response from a

second node and a data response from at least another node of the system, as recited in claim 36. As stated above with respect to claim 35, from which claim 36 depends, Arimilli fails to disclose the first conflict response. Thus, Arimilli cannot disclose the particular process employed in response to receiving the first conflict response, which process is recited in claim 36. Accordingly, Arimilli does not anticipate claim 36. Thus, Applicant's representative respectfully requests that the rejection of claim 36 be withdrawn.

28. The Anticipation Rejection of Claim 37

Claim 37 depends from claims 35 and 34 and is not anticipated for at least the same reasons as claims 35 and 34, and for the following reasons. In rejecting claim 37, the Final Action relies on the rejection of claim 9 (See Final Action, Page 19). In the rejection of claim 9, the Final Action cites paragraph [0033] of Arimilli for disclosing that coherency protocols typically requires that only a single agent can own each line at a given time for purposes of modification (See Final Action, Page 7). Applicant's representative respectfully submits that such a reliance on the cited section of paragraph [0033] of Arimilli illustrates that claim 37 has been misconstrued. While Arimilli may state that only a single agent can own each cache line for purposes of modification (See Arimilli, Par. [0033]), Arimilli is silent regarding enabling a shared copy of a line of data to be filled at least one of the other nodes of the system for a single use, as recited

in claim 37. Thus, Arimilli does not anticipate claim 37, and Applicant's representative respectfully requests that the rejection of claim 37 be withdrawn.

29. The Anticipation Rejection of Claim 39

Arimilli does not anticipate claim 39. In rejecting claim 39, the Final Action relies on the rationale for the rejection of claim 31 (See Final Action, Page 19). Arimilli does not disclose providing a first conflict response from a first node to source broadcast requests for data while a source broadcast request for data is pending at the first node, as recited in claim 39. Instead, the approach disclosed in Arimilli explicitly employs a CDP that provides snoop responses to deny ownership to conflicting transactions during the interval from issuing a transaction to modify a shared cache line until the agent is informed of the grant of ownership (See Arimilli, FIG. 2 and Par. [0033]). Accordingly, Arimilli fails to disclose claim 39, since in Arimilli, the CDP protects ownership of data until a processor complex 10a receives a combined response 154a (See Arimilli, Par. [0033]), while claim 39 recites that providing a first conflict response from the first node to source broadcast requests for data from the other nodes while a source broadcast request for the data is pending at the first node, as recited in claim 39 (emphasis added).

Further, Arimilli fails to disclose that a source broadcast request is ever pending at a first node, as recited in claim 39. Applicant's representative

respectfully submits that the reliance on the cited sections of Arimilli cited in the rejection of claim 31 (which is incorporated into the rejection of claim 39) appears to be misplaced. In particular, paragraph [0036] of Arimilli relates to a master 26 preventing access to a target cache by other agents until a store operation is completed. Nothing in the cited sections of Arimilli, (or anywhere else in Arimilli) discloses a source broadcast request pending at a first node, as recited in claim 39. Thus, for the reasons stated above, Arimilli fails to anticipate claim 39. Accordingly, Applicant's representative respectfully requests that the rejection of claim 39 be withdrawn.

30. The Anticipation Rejection of Claim 40

Claim 40 is not anticipated by Arimilli. The Final Action relies on the grounds for rejecting claim 34 as the basis for the rejection of claim 40. Applicant's representative respectfully disagrees that this rationale supports the contention that Arimilli anticipates claim 40. Arimilli does not disclose a plurality of nodes employing a cache coherency protocol operative to migrate a cache ordering point for a line of data from a target node to a source node in response to a source broadcast read request for the line of data issued by the source node, as recited in claim 40.

The rejection of claim 34 (incorporated into the rejection of claim 40) fails to address the concept of a cache coherency protocol operative to migrate a

cache ordering point for a line of data, as recited in claim 40. Instead, the incorporated rejection appears to erroneously focus on conflict resolution during a time interval 160 disclosed in Arimilli (See Final Action Page 16, citing paragraph [0029] of Arimilli). However, nothing in the cited section of Arimilli (or elsewhere in Arimilli) discloses a cache coherency protocol operative to migrate a cache ordering point for a line of data from a target node to a source node in response to a source broadcast read request for the line of data issued by the source node, as recited in claim 40.

Further, Arimilli fails to disclose a source broadcast read request for a line of data issued by a source node, as recited in claim 40. Applicant's representative respectfully submits that the sections of Arimilli cited in the rejection of claim 34 fail to disclose a source broadcast read request, in response to which the cache coherency protocol is operative to migrate a cache ordering point to the source node. Moreover, as discussed with respect to claim 34 and 16, Arimilli fails to teach that the invalidation of data at other nodes occurs responsive to the particular conditions recited in claim 40; namely, receiving a conflict response and migratory data both in response to the source broadcast read request. The differences between Arimilli and claim 40 are largely due to the particular emphasis of Arimilli relates to granting ownership to data that is either cached already in the shared or shared-owner state.

For these reasons, Arimilli fails to anticipate claim 40. Accordingly, Applicant's representative respectfully requests that the rejection of claim 40 be withdrawn.

B. 35 U.S.C. §103(a) rejection of claims 10-11, 23-24, 30 and 38 as being made obvious by Arimilli in view of Arimilli 2

Obviousness requires a suggestion of all limitations in a claim. *CFMT, Inc. v. YieldUp Int'l Corp.*, 349 F.3d 1333, 1342, 68 U.S.P.Q.2d 1940 (Fed. Cir. 2003).

1. The Obviousness Rejection of Claims 10, 23, 30 and 38

Claims 10, 23, 30 and 38 depend from claims 1, 16, 25 and 38, respectively, and are patentable for at least the same reasons as claims 1, 16, 25 and 38 and for the following reasons. In rejecting claims 10, 23, 30 and 38 the Final Action admits that Arimilli fails to teach or suggest employing a forward progress technique to obtain data, as recited in claims 10, 23, 30 and 38 (See Final Action, Page 20). However, in contrast to the contentions of the Final Action, Arimilli 2 fails to make up for the deficiencies of Arimilli.

Arimilli discloses that if a CDP responds to a Dclaim transaction with a negative acknowledgement (NACK) because another agent 10 has previously been granted ownership of the cache line, response logic 30 provides a retry read with the intent to modify combined response (RETRY_RWTIM CR) (See

Arimilli, Par. [0056]). Arimilli also discloses that the RETRY_RWTIM CR signifies that initiator agent 10 must issue a RWITM on the system bus 12 to gain ownership of an updated copy of the cache line from the agent 10 that is the new owner (See Arimilli, Par. [0056]). Since Arimilli teaches that the initiator agent 10 must issue a RWITM to gain ownership of an updated copy of the cache line from the agent 10 that is the new owner, one of ordinary skill would not be motivated to use a forward progress process to obtain the data as taught by Arimilli 2, as is being suggested in the Final Action. That is, since the CDP already provides the method of gaining ownership of an updated copy of the cache line, there is no motivation to combine the teachings of Arimilli to include a forward progress technique, as recited in claims 10, 23 30 and 38. A reference may be said to teach away from its combination with another reference when a person of ordinary skill, upon reading the reference, would be led in a direction divergent from the path that was taken by the applicant. *Tec Air, Inc. v. Denso Mfg. Mich., Inc.* 192 F.3d 1353, 1360, 52 U.S.P.Q.2D 1294. Applicant's representative respectfully submits that Arimilli teaches away from its combination with any reference (including Arimilli 2) that would implement a forward progress technique, since Arimilli already teaches a method of obtaining ownership of requested data (e.g., issuing a RWITM).

For these reasons, Arimilli taken in view of Arimilli 2 does not make claims 10, 23, 30 and 38 obvious. Accordingly, withdrawal of the rejection of claims 10, 23, 30 and 38 is respectfully requested.

2. The Obviousness Rejection of Claims 11 and 24

Claims 11 and 24 depend from claims 10 and 23, respectively, and are not obvious for at least the same reasons as claims 11 and 24, and for the following reasons. Applicant's representative respectfully submits that Arimilli 2 fails to teach or suggest that an action intended to achieve forward progress would include a forward progress cache coherency protocol, such that it would not be obvious to create the system of either claims 11 or 24 even if the teachings of Arimilli and Arimilli 2 were to be combined. Instead, Arimilli 2 teaches that action intended to achieve forward progress might include a push operation or an alteration of a coherency state (See Arimilli 2, Col. 6, lines 60-63). Since Arimilli 2 is silent on the use of a forward progress cache coherency protocol, as recited in claims 11 and 24, Arimilli taken in view of Arimilli 2 fails to make claims 11 and 24 obvious. Accordingly, Applicant's representative respectfully requests that the rejection of claims 11 and 24 be withdrawn.

C. 35 U.S.C. §103(a) rejection of claim 15 as being unpatentable over Arimilli in view of Arimilli 2 and in further view of Martin

Claim 15 depends from claim 1 and is patentable for at least the same reasons as claim 1, and for the following reasons. In rejecting claim 15, the Final Action admits that Arimilli does not teach or suggest a hybrid cache coherency protocol, wherein a first node employs an associated forward progress protocol to reissue a request for data in response to the request failing in a source broadcast protocol, as recited in claim 15. However, in contrast to the contentions of the Final Action, the addition of Arimilli and Martin fail to make up for the deficiencies of Arimilli.

Applicant's representative respectfully submits that in contrast to the contentions of the Final Action Arimilli 2 fails to teach or suggest a forward progress cache coherency protocol, such that it would not be obvious to create the system of claim 15 even if the teachings of Arimilli, Arimilli 2 and Martin were to be combined. Instead, Arimilli 2 teaches that action intended to achieve forward progress might include a push operation or an alteration of coherency state (See Arimilli 2 at Col. 6, lines 60-63). That is, Arimilli 2 provides no teaching or suggestion for the use of a forward progress coherency cache protocol, such as recited in claim 15.

Moreover, while Martin may disclose that different protocols can be utilized, Martin teaches that different protocols are utilized depending on bandwidth requirements of the system (See Martin, Abstract). There is nothing to suggest, however, that a node in the system of Martin would employ a source broadcast-based protocol to issue the source broadcast request and an associated forward progress protocol to reissue a request for such data in response to the request failing in the source broadcast protocol, as recited in claim 15. Thus, even if the teachings of Arimilli, Arimilli 2 and Martin were combined, the purported combination, provides no suggestion of the ability to switch between protocols, as recited in claim 15.

Additionally, Arimilli discloses that if a CDP responds to a Dclaim transaction with a negative acknowledgement (NACK) because another agent 10 has previously been granted ownership of the cache line, response logic 30 provides a retry read with the intent to modify combined response (RETRY_RWTIM CR) (See Arimilli, Par. [0056]). Arimilli also discloses that the RETRY_RWTIM CR signifies that initiator the agent 10 must issue a RWITM on the system bus 12 to gain ownership of an updated copy of the cache line from the agent 10 that is the new owner (See Arimilli, Par. [0056]). Since Arimilli teaches that the initiator agent 10 must issue a RWITM to gain ownership of an updated copy of the cache line from the agent 10 that is the new owner, one of ordinary skill would not be motivated to use a forward progress protocol to obtain

the data as allegedly taught by Arimilli 2, as is being suggested in the Final Action. That is, since the CDP already provides the method of gaining ownership of an updated copy of the cache line, there is no motivation to modify the teachings of Arimilli to include a forward progress protocol, as recite in claim 15.

A reference may be said to teach away from its combination with another source when a person of ordinary skill, upon reading the reference, would be led in a direction divergent from the path that was taken by the applicant. *Tec Air, Inc. v. Denso Mfg. Mich., Inc.* 192 F.3d 1353, 1360, 52 U.S.P.Q.2D 1294. Applicant's representative respectfully submits that Arimilli teaches away from its combination with any reference (including Arimilli 2 and Martin) that would implement a forward progress protocol, since Arimilli already teaches a method of obtaining ownership of data (e.g., issuing a RWITM). Therefore, Arimilli, Arimilli 2 and Martin fail to make claim 15 obvious. Accordingly, Applicant's representative respectfully requests that the rejection of claim 15 be withdrawn.

IX. APPENDICES

The first attached Appendix contains a copy of the claims on appeal.

The second and third Appendices have been included to comply with statutory requirements.

No additional fees should be due for this Brief. In the event any fees are due in connection with the filing of this document, the Commissioner is authorized to charge those fees to Deposit Account No. 08-2025.

Respectfully submitted,

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I hereby certify that this correspondence is being transmitted to the U.S. Patent and Trademark Office via electronic filing on December 5, 2007.

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Claims Appendix

Claim 1 (Finally Rejected) A system comprising:

a first node that provides a source broadcast request for data, the first node being operable to respond in a first manner to other source broadcast requests for the data while the source broadcast request for the data is pending at the first node;

the first node being operable to respond in a second manner to the other source broadcast requests for the data in response to receiving an ownership data response at the first node, the ownership data response comprising a copy of the data.

Claim 2 (Finally Rejected) The system of claim 1, wherein the ownership data response comprises an indication to the first node that the data associated with the ownership data response comprises migratory data.

Claim 3 (Finally Rejected) The system of claim 2, wherein the migratory data comprises a cache ordering point for serializing source broadcast requests for the data, the cache ordering point migrating to the first node from a node that provides the ownership data response.

Claim 4 (Finally Rejected) The system of claim 3, wherein the first node is operative to provide an ownership data response to a second node requesting the data, such that the cache ordering point migrates from the first node to the second node.

Claim 5 (Finally Rejected) The system of claim 1, wherein the source broadcast request from the first node comprises a source broadcast read request, the first node, when responding in the first manner, provides a first response to the other source broadcast requests for the data indicating that the first node has a conflicting read request for the data.

Claim 6 (Finally Rejected) The system of claim 5, further comprising a second node that provides one of the other source broadcast requests for the data and receives the first response from the first node, the second node being operative to fill a shared copy of data received from a third node in response to the one of the other source broadcast requests for the data.

Claim 7 (Finally Rejected) The system of claim 5, further comprising a second node that provides one of the other source broadcast requests for the data and receives the first response from the first node, the second node being operative to fill a copy of data received from a home node for the data.

Claim 8 (Finally Rejected) The system of claim 1, wherein the first node, when responding in the second manner, provides a second response to the other source broadcast requests for the data indicating that the source broadcast request from the first node is a conflicting request for the data and that migration of the data to the first node is in progress.

Claim 9 (Finally Rejected) The system of claim 8, further comprising a second node that provides one of the other source broadcast requests for the data and receives the second response from the first node, the second node being operative to employ a copy of the data received from a third node for only a single use.

Claim 10 (Finally Rejected) The system of claim 8, further comprising a second node that provides one of the other source broadcast requests for the data and receives the second response from the first node, the second node being operative to employ a forward progress technique to obtain the data.

Claim 11 (Finally Rejected) The system of claim 10, wherein the forward progress technique comprises a forward progress cache coherency protocol.

Claim 12 (Finally Rejected) The system of claim 1, wherein the first node employs an invalidate line command to other nodes of the system to remove incorrect copies of the data and any stale copies of the data cached at the other nodes of the system.

Claim 13 (Finally Rejected) The system of claim 1, wherein the source broadcast request provided by the first node is broadcast using a source broadcast cache coherency protocol.

Claim 14 (Finally Rejected) The system of claim 1, wherein the first node defines a processor having an associated cache, the associated cache of the processor comprising a plurality of cache lines, each cache line having a respective tag address that identifies associated data and each cache line having state information that indicates a state of the associated data for the respective cache line, the processor being capable of communicating with other nodes of the system through an interconnect, the system further comprising a cache controller associated with the processor, the cache controller being operative to manage data requests and responses for the associated cache of the processor, the cache controller effecting state transitions associated with the data in the associated cache of the processor based on the data requests and responses for the associated cache of the processor.

Claim 15 (Finally Rejected) The system of claim 1, wherein the system implements a hybrid cache coherency protocol wherein the first node employs a source broadcast-based protocol to issue the source broadcast request for the data, the first node employing an associated forward progress protocol to reissue a request for the data in response to the request failing in the source broadcast protocol.

Claim 16 (Finally Rejected) A multi-processor network comprising:

a source processor node that provides a source broadcast read request for data;

the source processor node issuing an invalidate line command to other processor nodes of the system in response to receiving a data response that transfers a copy of the data and a cache ordering point for the data to the source processor node.

Claim 17 (Finally Rejected) The multi-processor network of claim 16, wherein the invalidate line command issued by the source processor node removes incorrect cached copies of the data at the other processor nodes of the system and stale copies of the data filled at the other processor nodes of the system.

Claim 18 (Finally Rejected) The multi-processor network of claim 16, wherein the source processor node is operative to provide a first conflict response to source broadcast requests for the data from the other processor nodes prior to receiving the data response that transfers the cache ordering point for the data to the source processor node,

the source processor node being operative to provide a second conflict response to at least one source broadcast request for the data from at least one of the other processor nodes in response to the source processor node receiving a conflict response and receiving the data response that transfers the cache ordering point for the data to the source processor node.

Claim 19 (Finally Rejected) The system of claim 18, wherein the source processor node provides the first response to the source broadcast requests for the data from the other processor nodes when the source processor node has a pending conflicting read request for the data.

Claim 20 (Finally Rejected) The system of claim 19, wherein the other processor nodes receiving the first response from the source processor node are operative to fill a copy of the data received from at least one of the other processor nodes and from system memory.

Claim 21 (Finally Rejected) The system of claim 18, wherein the source processor node provides the second response in response to the source processor node receiving a request for the data that conflicts with the source broadcast request for the data after migration of the copy of the data to the source processor node has begun.

Claim 22 (Finally Rejected) The system of claim 21, wherein one of the other processor nodes comprises a second processor node that provides a respective one of the other source broadcast requests for the data and receives the second response from the first node, the second processor node being operative to employ a copy of the data received from a third node for a single use.

Claim 23 (Finally Rejected) The system of claim 21, wherein one of the other processor nodes comprises a second processor node that provides one of the other source broadcast requests for the data according to broadcast-based protocol, the second processor node being operative to employ a forward progress technique to obtain the data in response to the second response from the first node.

Claim 24 (Finally Rejected) The system of claim 23, wherein the forward progress technique comprises a forward progress cache coherency protocol.

Claim 25 (Finally Rejected) A system comprising:

means for broadcasting a source broadcast request for data from a first node; and

means for issuing from the first node an invalidate line command to other nodes of the system in response to receiving a conflict response from at least one other node in the system and a data response transferring a cache ordering point for the data to the first node.

Claim 26 (Finally Rejected) The system of claim 25, further comprising:

means for providing a first conflict response to source broadcast requests for the data from other nodes prior to receiving a data response transferring a cache ordering point for the data to the first node; and

means for providing a second conflict response to source broadcast requests for the data from other nodes in response to receiving a data response transferring a cache ordering point for the data to the first node.

Claim 27 (Finally Rejected) The system of claim 26, further comprising means for filling a shared copy of the data at one of the other nodes in response to receiving the first conflict response from the first node.

Claim 28 (Finally Rejected) The system of claim 26, further comprising means for filling a copy of the data received from system memory at one of the other nodes in response to receiving the first conflict response from the first node.

Claim 29 (Finally Rejected) The system of claim 26, further comprising means for employing a shared copy of the data for a single use at one of the other nodes in response to the one of the other nodes receiving the second conflict response from the first node.

Claim 30 (Finally Rejected) The system of claim 26, further comprising means for employing a forward progress technique at one of the other nodes to obtain the data in response to receiving the second conflict response from the first node.

Claim 31 (Finally Rejected) A system comprising:

means for broadcasting a source broadcast request for data from a first node;

means for providing from the first node a first conflict response to other source broadcast requests for the data from other nodes while the source broadcast for the data is pending at the first node; and

means for providing a second conflict response to the other source broadcast requests for the data from the other nodes after receiving an ownership data response at the first node while the source broadcast for the data is pending at the first node, the ownership data response comprising a copy of the data.

Claim 32 (Finally Rejected) The system of claim 31, further comprising means for cleaning-up incorrect copies of the data and stale copies of the data filled at other nodes of the system in response to receiving the ownership data response at the first node.

Claim 33 (Finally Rejected) The system of claim 31, further comprising means for issuing an invalidate line command to the other nodes of the system in response to receiving the ownership data response at the first node.

Claim 34 (Finally Rejected) A method comprising:

migrating a line of data and a cache ordering point for the line of data from a first node of a system to a second node of the system; and

issuing an invalidate line command for the line of data from the second node to other nodes of the system in response to receiving a conflict response from at least one other node in the system and to the cache ordering point migrating from the first node to the second node.

Claim 35 (Finally Rejected) The method of claim 34, further comprising:

providing a first conflict response from the second node to requests for the line of data from the other nodes of the system prior to the cache ordering point migrating from the first node to the second node; and

providing a second conflict response from the second node to requests for the line of data from the other nodes after the cache ordering point migrates from the first node to the second node.

Claim 36 (Finally Rejected) The method of claim 35, further comprising:

enabling a shared copy of the line of data to be filled at one of the other nodes of the system in response to receiving the first conflict response from the second node and a data response from at least another node of the system; and

enabling a copy of the line of data received from system memory to be filled at one of the other nodes of the system in response to receiving the first conflict response from the second node.

Claim 37 (Finally Rejected) The method of claim 35, further comprising enabling a shared copy of the line of data to be filled at least one of the other nodes of the system for a single use by the at least one of the other nodes of the system in response to receiving the second conflict response from the first node.

Claim 38 (Finally Rejected) The method of claim 35, further comprising employing a forward progress technique at the other nodes to fill the cache line in response to receiving the second conflict response from the first node.

Claim 39 (Finally Rejected) A method comprising:

providing a first conflict response from a first node to source broadcast requests for data from other nodes while a source broadcast request for the data is pending at the first node; and

providing a second conflict response from the first node to the other source broadcast requests for the data from the other nodes in response to receiving a conflict response and an ownership data response at the first node.

Claim 40 (Finally Rejected) A computer system comprising a plurality of nodes, the plurality of nodes employing a cache coherency protocol operative to migrate a cache ordering point for a line of data from a target node to a source node in response to a source broadcast read request for the line of data issued by the source node, the source node being operative to invalidate the line of data at other nodes of the computer system in response to receiving a conflict response and migratory data to the source broadcast read request.

Evidence Appendix

None

Related Proceedings Appendix

"CACHE COHERENCY PROTOCOL WITH ORDERING POINTS," Application Serial No. 10/760,640; "SYSTEM AND METHOD FOR RESOLVING TRANSACTIONS IN A CACHE COHERENCY PROTOCOL," Application Serial No. 70/760,813; "SYSTEM AND METHOD TO FACILITATE ORDERING POINT MIGRATION TO MEMORY," Application Serial No. 10/760,599; "SYSTEM AND METHOD FOR CREATING ORDERING POINTS," Application Serial No. 10/760,652;" "SYSTEM AND METHOD FOR READ MIGRATORY OPTIMIZATION IN A CACHE COHERENCY PROTOCOL," Application Serial No. 10/761,044; "SYSTEM AND METHOD FOR BLOCKING DATA RESPONSES," Application Serial No. 10/761,034; "SYSTEM AND METHOD FOR NON-MIGRATORY REQUESTS IN A CACHE COHERENCY PROTOCOL," Application Serial No. 10/760,659; " "SYSTEM AND METHOD FOR RESPONSES BETWEEN DIFFERENT CACHE COHERENCY PROTOCOLS," Application Serial No. 10/760,436, all of which are filed contemporaneously herewith and are incorporated herein by reference.